

We claim:

1. A method of relating a directory number to a mobile station in a wireless network for an incoming call from a calling party using a calling party device to a called party using the mobile station, wherein the directory number is associated with a first mobile switching center and wireless service to the mobile station is associated with a second mobile switching center, the method including the steps:

a) querying a local number portability data storage device for stored routing information associated with the directory number and time information associated with a date and time when a previous number portability query associated with the directory number returned the stored routing information;

b) receiving a return result from the local number portability data storage device;

c) determining if the return result from the local number portability data storage device includes the stored routing information;

d) determining if the stored routing information is expired by determining if the time information associated with the stored routing information exceeds a first predetermined time threshold; and

e) if the return result from the local number portability data storage device includes the stored routing information and if the stored routing information is not expired, forwarding the incoming call and the stored routing information to the second mobile switching center, wherein the stored routing information associates the directory number with the second mobile switching center.

2. The method set forth in claim 1, further including the steps:

f) if the stored routing information is expired, querying an external number portability database for current routing information associated with the directory number;

g) receiving a return result from the external number portability database;

h) determining if the return result from the external number portability database includes the current routing information;

i) if the return result from the external number portability database includes the current routing information, forwarding the incoming call and the current routing information to the second mobile switching center, wherein the current routing information associates the directory number with the second mobile switching center; and

j) storing the current routing information and time information associated with a date and time when the associated number portability query was performed in the local number portability data storage device in relation to the directory number.

3. The method set forth in claim 1, further including the steps:

f) if the stored routing information is expired, querying an external number portability database for current routing information associated with the directory number;

g) receiving a return result from the external number portability database;

h) determining if the return result from the external number portability database includes the current routing information;

i) if the return result from the external number portability database includes the current routing information, forwarding the incoming call and the current routing information to a third mobile switching center, wherein the current routing information associates the directory number with the third mobile switching center; and

j) storing the current routing information and time information associated with a date and time when the associated number portability query was performed in the local number portability data storage device in relation to the directory number.

4. The method set forth in claim 1, further including the steps:

f) if the return result from the local number portability data storage device does not include the stored routing information, querying a home location

register associated with the first mobile switching center for location information associated with the mobile station;

g) receiving a return result from the home location register;

h) determining if the return result from the home location register includes the location information;

i) if the return result from the home location register does not include the location information, querying an external number portability database for current routing information associated with the directory number;

j) receiving a return result from the external number portability database;

k) determining if the return result from the external number portability database includes the current routing information;

l) if the return result from the external number portability database includes the current routing information, forwarding the incoming call and the current routing information to the second mobile switching center, wherein the current routing information associates the directory number with the second mobile switching center; and

m) storing the current routing information and time information associated with a date and time when the associated number portability query was performed in the local number portability data storage device in relation to the directory number.

5. The method set forth in claim 1, further including the steps:

f) if the return result from the local number portability data storage device does not include the stored routing information, querying a home location register associated with the first mobile switching center for location information associated with the mobile station;

g) receiving a return result from the home location register;

h) determining if the return result from the home location register includes the location information;

i) if the return result from the home location register does not include the location information, querying an external number portability database for current routing information associated with the directory number;

j) receiving a return result from the external number portability database;

k) determining if the return result from the external number portability database includes the current routing information;

l) if the return result from the external number portability database includes the current routing information, forwarding the incoming call and the current routing information to a third mobile switching center, wherein the current routing information associates the directory number with the third mobile switching center; and

m) storing the current routing information and time information associated with a date and time when the associated number portability query was performed in the local number portability data storage device in relation to the directory number.

6. The method set forth in claim 1, further including the steps:

f) if the return result from the local number portability data storage device does not include the stored routing information, querying an external number portability database for current routing information associated with the directory number;

g) receiving a return result from the external number portability database;

h) determining if the return result from the external number portability database includes the current routing information;

i) if the return result from the external number portability database includes the current routing information, forwarding the incoming call and the current routing information to the second mobile switching center, wherein the current routing information associates the directory number with the second mobile switching center; and

j) storing the current routing information and time information associated with a date and time when the associated number portability query was performed in the local number portability data storage device in relation to the directory number.

7. The method set forth in claim 1, further including the steps:

f) if the return result from the local number portability data storage device does not include the stored routing information, querying an external number portability database for current routing information associated with the directory number;

g) receiving a return result from the external number portability database;

h) determining if the return result from the external number portability database includes the current routing information;

i) if the return result from the external number portability database includes the current routing information, forwarding the incoming call and the current routing information to a third mobile switching center, wherein the current routing information associates the directory number with the third mobile switching center; and

j) storing the current routing information and time information associated with a date and time when the associated number portability query was performed in the local number portability data storage device in relation to the directory number.

8. The method set forth in claim 1, before step a), further including the steps:

f) querying a home location register associated with the first mobile switching center for location information associated with the mobile station;

g) receiving a return result from the home location register; and

h) determining if the return result from the home location register includes the location information, wherein the return result from the home location

register does not include the location information.

9. The method set forth in claim 1 wherein the forwarding from the first mobile switching center to the second mobile switching center in step e) is via an intermediate mobile switching center, further including the steps:

f) receiving the forwarded incoming call and the stored routing information from the first mobile switching center at the intermediate mobile switching center;

g) determining whether or not to accept the stored routing information at the intermediate mobile switching center using predetermined standards; and

h) if the stored routing information is accepted by the intermediate mobile switching center, forwarding the incoming call and the routing information from the intermediate mobile switching center to the second mobile switching center.

10. The method set forth in claim 9, further including the steps:

i) if the stored routing information is not accepted by the intermediate mobile switching center, querying an external number portability database for current routing information associated with the directory number; and

j) receiving a return result from the external number portability database, wherein the return result includes the current routing information.

11. The method set forth in claim 10 wherein the current routing information associates the directory number with the second mobile switching center, further including the step:

k) forwarding the incoming call and the current routing information from the intermediate switching center to the second mobile switching center.

12. The method set forth in claim 10 wherein the current routing information associates the directory number with a third mobile switching center, further including the step:

k) forwarding the incoming call and the current routing information from the intermediate switching center to the third mobile switching center.

13. The method set forth in claim 12, further including the step:

l) communicating an override stored routing information message from the intermediate mobile switching center to the first mobile switching center including at least one of the directory number, current routing information associated with the directory number which associates the directory number with the third mobile switching center, and time information associated with a date and time when the number portability query associated with the current routing information was performed.

14. The method set forth in claim 13, further including the step:

m) receiving the override stored routing information message from the intermediate mobile switching center at the first mobile switching center; and

n) deleting the current routing information and associated time information stored in relation to the directory number from the local number portability data storage device.

15. The method set forth in claim 9 wherein the time information is forwarded along with the stored routing information in step e) and the predetermined standards in step g) include at least one of: i) accepting all stored routing information, ii) accepting the stored routing information if the time information does not exceed a second predetermined time threshold, and iii) accepting no stored routing information.

16. The method set forth in claim 1 wherein the time information is forwarded along with the stored routing information in step e) and the stored routing information and time information is forwarded to the second mobile switching center in a timed forward call indicator message.

17. The method set forth in claim 16 wherein the timed forward call indicator message includes at least one of a local routing number segment, a called

party number segment, a timed forward call indicator bit, and a time information segment, wherein the local routing number segment is based on the stored routing information, wherein the timed forward call indicator bit indicates stored routing information is provided in the timed forward call indicator message, wherein the time information segment is based on the time information associated with the stored routing information.

18. The method set forth in claim 1 wherein the time information includes at least one of: i) a timestamp reflecting an approximate date and time when the previous number portability query that returned the stored routing information for the directory number was performed, ii) a timestamp reflecting a date and time after which the stored routing information is considered expired by the first mobile switching center, and iii) a value reflecting an amount of time until the first mobile switching center considers the stored routing information expired.

19. A method of relating a directory number to a mobile station in a wireless network for an incoming call from a calling party using a calling party device to a called party using the mobile station, wherein the directory number is associated with a first mobile switching center and wireless service to the mobile station is associated with a second mobile switching center, the method including the steps:

a) querying a local number portability data storage device for stored routing information associated with the directory number and time information associated with a date and time when a previous number portability query associated with the directory number returned the stored routing information;

b) receiving a return result from the local number portability data storage device;

c) determining if the return result from the local number portability data storage device includes the stored routing information;

d) determining if the stored routing information is expired by determining if the time information associated with the stored routing information exceeds a first predetermined time threshold;



e) if the return result from the local number portability data storage device does not include the stored routing information, advancing to step k), otherwise, if the stored routing information is not expired, forwarding the incoming call and the stored routing information to the second mobile switching center and the process is ended, wherein the stored routing information associates the directory number with the second mobile switching center;

f) querying an external number portability database for current routing information associated with the directory number;

g) receiving a return result from the external number portability database;

h) determining if the return result from the external number portability database includes the current routing information;

i) if the return result from the external number portability database includes the current routing information, forwarding the incoming call and the current routing information to the second mobile switching center, wherein the current routing information associates the directory number with the second mobile switching center;

j) storing the current routing information and time information associated with a date and time when the associated number portability query was performed in the local number portability data storage device in relation to the directory number and the process is ended;

k) querying a home location register associated with the first mobile switching center for location information associated with the mobile station;

l) receiving a return result from the home location register;

m) determining if the return result from the home location register includes the location information;

n) if the return result from the home location register includes the location information includes the location information, forwarding the incoming call to the mobile station and returning temporary routing information to a telecommunication switch serving the calling party and the process is ended, otherwise continuing the process with step f).

20. The method set forth in claim 19 wherein the forwarding from the first mobile switching center to the second mobile switching center in step e) is via an intermediate mobile switching center, in conjunction with step e), further including the steps:

- o) receiving the forwarded incoming call and the stored routing information from the first mobile switching center at the intermediate mobile switching center;

- p) determining whether or not to accept the stored routing information at the intermediate mobile switching center using predetermined standards; and

- q) if the stored routing information is accepted by the intermediate mobile switching center, forwarding the incoming call and the routing information from the intermediate switching center to the second mobile switching center.

21. The method set forth in claim 20, in conjunction with step e), further including the steps:

- r) if the stored routing information is not accepted by the intermediate mobile switching center, querying an external number portability database for current routing information associated with the directory number; and

- s) receiving a return result from the external number portability database, wherein the return result includes the current routing information.

22. The method set forth in claim 21 wherein the current routing information associates the directory number with the second mobile switching center, in conjunction with step e), further including the step:

- t) forwarding the incoming call and the current routing information from the intermediate switching center to the second mobile switching center.

23. The method set forth in claim 21 wherein the current routing information associates the directory number with a third mobile switching center, in conjunction with step e), further including the step:

t) forwarding the incoming call and the current routing information from the intermediate switching center to the third mobile switching center.

24. The method set forth in claim 23, in conjunction with step e), further including the step:

u) communicating an override stored routing information message from the intermediate mobile switching center to the first mobile switching center including the directory number, current routing information associated with the directory number which associates the directory number with the third mobile switching center, and time information associated with a data and time when the number portability query associated with the current routing information was performed.

25. The method set forth in claim 24, in conjunction with step e), further including the step:

v) receiving the override stored routing information message from the intermediate mobile switching center at the first mobile switching center; and

w) storing the current routing information and time information received in the override stored routing information message in the local number portability data storage device in association with the directory number.

26. A telecommunication system for relating a directory number to a mobile station for an incoming call from a calling party using a calling party device to a called party using the mobile station, the telecommunication system including:

a first mobile switching center associated with the directory number;

a local number portability data storage device in communication with the first mobile switching center; and

a second mobile switching center in operative communication with the first mobile switching center and associated with wireless service to the mobile station; and

the first mobile switching center further including:

means for querying a local number portability data storage device for stored routing information associated with the directory number and time information associated with a date and time when a previous number portability query associated with the directory number returned the stored routing information;

means for receiving a return result from the local number portability data storage device;

means for determining if the return result from the local number portability data storage device includes the stored routing information;

means for determining if the stored routing information is expired by determining if the time information exceeds a first predetermined time threshold; and

means for forwarding the incoming call and the stored routing information to the second mobile switching center if the return result from the local number portability data storage device includes the stored routing information and if the stored routing information is not expired, wherein the stored routing information associates the directory number with the second mobile switching center.

27. The telecommunication system set forth in claim 26, further including:

a number portability database in communication with the first mobile switching center; and

the first mobile switching center further including:

means for querying the number portability database for current routing information associated with the directory number if the stored routing information is expired;

means for receiving a return result from the number portability database;

means for determining if the return result from the number portability database includes the current routing information;

means for forwarding the incoming call and the current routing information to the second mobile switching center if the return result from the number portability database includes the current routing information, wherein the current routing information associates the directory number with the second mobile switching center; and

means for storing the current routing information and time information associated with a date and time when the associated number portability query was performed in the local number portability data storage device in relation to the directory number.

28. The telecommunication system set forth in claim 26, further including:

a home location register in communication with the first mobile switching center; and

a number portability database in communication with the first mobile switching center; and

the first mobile switching center further including:

means for querying the home location register associated with the first mobile switching center for location information associated with the mobile station if the return result from the local number portability data storage device does not include the stored routing information;

means for receiving a return result from the home location register;

means for determining if the return result from the home location register includes the location information;

means for querying the number portability database for current routing information associated with the directory number if the return result from the home location register does not include the location information;

means for receiving a return result from the number portability database;

means for determining if the return result from the number portability database includes the current routing information;

means for forwarding the incoming call and the current routing information to the second mobile switching center if the return result from the number portability database includes the current routing information, wherein the current routing information associates the directory number with the second mobile switching center; and

means for storing the current routing information and time information associated with a date and time when the associated number portability query was performed in the local number portability data storage device in relation to the directory number.

29. The telecommunication system set forth in claim 26, further including:

a number portability database in communication with the first mobile switching center; and

the first mobile switching center further including:

means for querying the number portability database for current routing information associated with the directory number if the return result from the local number portability data storage device does not include the stored routing information;

means for receiving a return result from the number portability database;

means for determining if the return result from the number portability database includes the current routing information;

means for forwarding the incoming call and the current routing information to the second mobile switching center if the return result from the number portability database includes the current routing information, wherein the current routing information associates the directory number with the second mobile switching center; and

means for storing the current routing information and time information associated with a date and time when the associated number portability query was performed in the local number portability data storage device in relation to the directory number.

30. The telecommunication system set forth in claim 26, further including:

a home location register in communication with the first mobile switching center; and

the first mobile switching center further including:

means for querying the home location register associated with the first mobile switching center for location information associated with the mobile station;

means for receiving a return result from the home location register; and

means for determining if the return result from the home location register includes the location information, wherein the return result from the home location register does not include the location information.

31. The telecommunication system set forth in claim 26, further including:

an intermediate mobile switching center in operative communication with the first and second mobile switching centers, wherein the forwarding of the incoming call and the stored routing information from the first mobile switching center to the second mobile switching center is via the intermediate mobile switching center, the intermediate mobile switching center further including:

means for receiving the forwarded incoming call and the stored routing information from the first mobile switching center;

means for determining whether or not to accept the stored routing information using predetermined standards; and

means for forwarding the incoming call and the routing information to the second mobile switching center if the stored routing information is accepted.

32. The telecommunication system set forth in claim 31, further including:

a number portability database in communication with the intermediate mobile switching center; and

the intermediate mobile switching center further including:

means for querying the number portability database for current routing information associated with the directory number if the stored routing information is not accepted; and

means for receiving a return result from the number portability database, wherein the return result includes the current routing information.

33. The telecommunication system set forth in claim 32 wherein the current routing information associates the directory number with the second mobile switching center, the intermediate mobile switching center further including:

means for forwarding the incoming call and the current routing information from the intermediate mobile switching center to the second mobile switching center.

34. The telecommunication system set forth in claim 32 wherein the current routing information associates the directory number with a third mobile switching center, the intermediate mobile switching center further including:

means for forwarding the incoming call and the current routing information from the intermediate mobile switching center to the third mobile switching center.

35. The telecommunication system set forth in claim 34, the intermediate mobile switching center further including:

means for communicating an override stored routing information message from the intermediate mobile switching center to the first mobile switching center including the directory number, current routing information associated with the directory number which associates the directory number with the third mobile switching center, and time information associated with a date and time when the number portability query associated with the current routing information was



performed.

36. The telecommunication system set forth in claim 35, the first mobile switching center further including:

means for receiving the override stored routing information message from the intermediate mobile switching center; and

means for storing the current routing information and time information received in the override stored routing information message in the local number portability data storage device in relation to the directory number.